

FIRST RECORDS FROM THE CANADIAN MARITIME PROVINCES OF THREE EUROPEAN INSECTS INJURIOUS TO ORNAMENTAL PLANTS

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Abstract.—Three Old World insects of limited distribution in North America are newly recorded for the Canadian Maritime Provinces. *Pyrrhalta viburni* (Paykull) (Coleoptera: Chrysomelidae), *Yponomeuta cagnagella* (Hübner) (Lepidoptera: Yponomeutidae), and *Macrophya punctumalbum* (L.) (Hymenoptera: Tenthredinidae) were collected at Dartmouth and Halifax, Nova Scotia. Notes on host plants of these pests of commonly planted ornamental shrubs and trees are provided, as well as characters that facilitate their recognition in the Nearctic fauna.

Key Words: Coleoptera, Lepidoptera, Hymenoptera, adventive insects, plant pests, Canadian Maritime Provinces

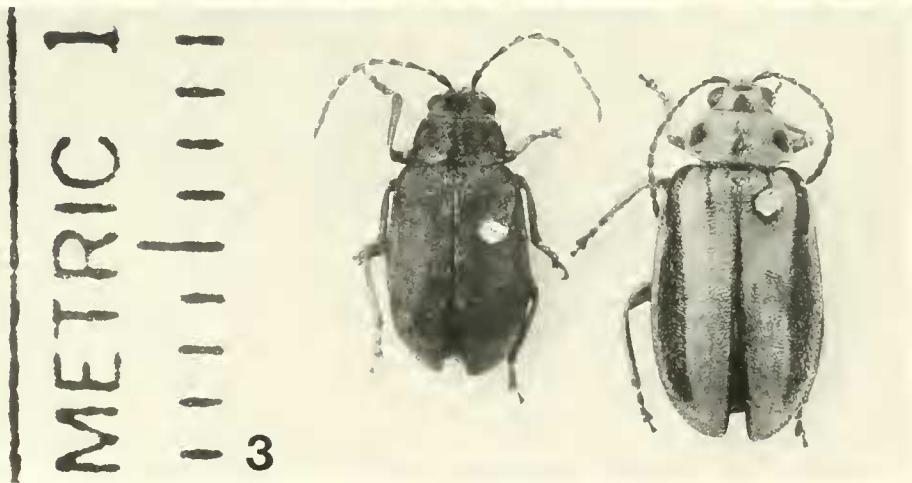
Nearly every year since 1978 we have made a series of "detection" trips in eastern North America to search for insects new to the Western Hemisphere, Canada, or the United States. These trips also enable us to document the spread of recently established adventive species and to study their habits in an alien environment. Using "biological bias," we have concentrated on areas vulnerable to invasion by exotic species, particularly disturbed sites such as urban vacant lots near principal ports of entry.

A trip to the Canadian Maritime Provinces in 1993 resulted in the discovery of three Old World species known to have a limited distribution in North America—a viburnum-feeding chrysomelid, *Pyrrhalta viburni* (Paykull); a privet sawfly, *Macrophya punctumalbum* (L.); and an ermine moth, *Yponomeuta cagnagella* (Hübner), that specializes on euonymus. Specimens of all three species were collected at Halifax, Nova Scotia (Halifax Co.), on 26 June 1993; larval specimens of *P. viburni* were also taken

at Dartmouth, Nova Scotia (Halifax Co.), on Halifax Harbour across from Halifax, on 26 June. Our records of these economically important species are the first for the Maritime Provinces.

Pyrrhalta viburni (Paykull) (Figs. 1-3; Map 1)

Historical background.—Becker (1979) provided the first records of the North American establishment of this Eurasian galerucine chrysomelid: Ottawa, Ontario, and nearby Hull, Quebec. *Pyrrhalta viburni* had been collected previously in Ontario (at Fonthill, in 1947), but subsequent observations failed to yield additional specimens or evidence of its establishment. During summer 1978, this chrysomelid severely injured ornamental viburnums, mainly cultivars of *Viburnum opulus* L.; it was also present at Ottawa on *V. dentatum* L. and *V. lantana* L. used as ornamentals and on the native *V. rafinesquianum* Schultes. This



species has not been detected in the United States.

Remarks.—Larvae were abundant on *V. opulus* (Fig. 1) in the Public Gardens in Halifax (Spring Garden Rd. at South Park St.) where they were skeletonizing the foliage (Fig. 2) and were also feeding in the inflorescences. At Dartmouth, smaller numbers of larvae were observed on *Viburnum* sp. growing in a hedgerow. Although adults were not present, the galerucine larvae we collected fit the description and habits of *P. viburni*, leaving little doubt about the identity of the viburnum feeder observed in Nova Scotia.

Recognition features.—*Pyrrhalta viburni* is rather closely allied to the elm leaf beetle, *P. luteola* (Müller), and thus adults of the two are similar in overall appearance. However, specimens of *P. viburni* (Fig. 3) are generally smaller than those of *P. luteola* (4.5–6.5 mm vs. 5.8–6.8 mm). Moreover, *P. viburni* differs from the latter species by the dorsal surface with smaller, denser punctures, with space between punctures almost rugose (vs. large, distinct punctures, with surface glossy between punctures), by the dorsal surface with thick, golden-grey pubescence (vs. thin pubescence), and by the elytra generally brownish with dark humeral angles (vs. elytra generally light yellowish-brown with wide, dark humeral stripe extending nearly to apex of each elytron) (Becker 1979). Adult and immature stages of *P. viburni* feed exclusively on species of *Viburnum*, whereas those of *P. luteola* are restricted to species of *Ulmus* (elm).

References.—Complete information on the biology and seasonal history of *P. viburni* in North America and Europe is given by Becker (1979) and Balachowsky (1963), respectively.

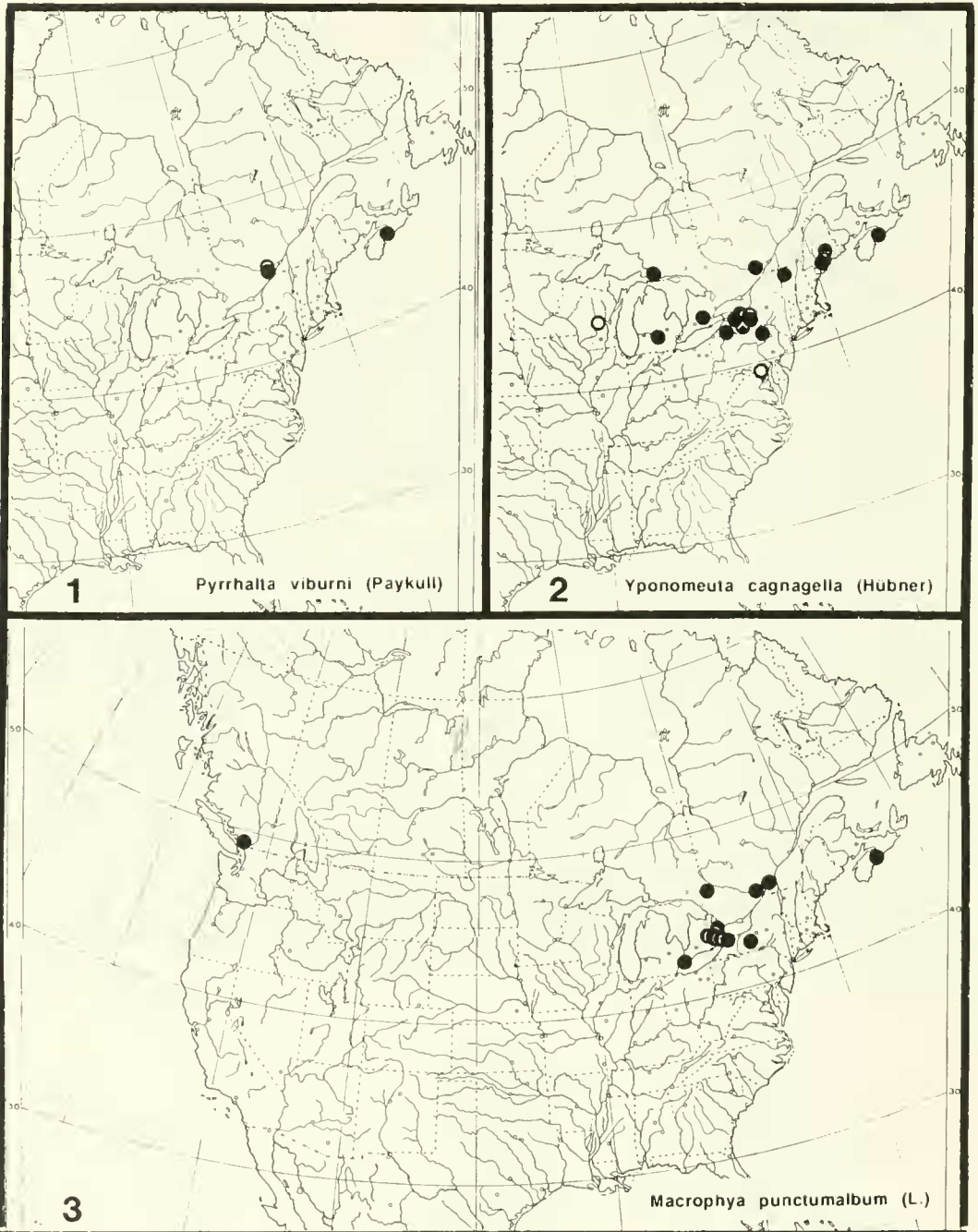
Yponomeuta cagnagella (Hübner)
(Figs. 4–6; Map 2)

Historical background.—This European pest of spindle tree, *Euonymus europaeus* L., was first recorded in North America from Ontario (no specific locality) by Turner et al. (1975). Hoebeke (1987) gave the first United States records—15 counties in central and western New York—and reported the seasonal history and habits of North American populations. The most common host in New York was *E. europaeus*, but other euonymus species used in landscape plantings were also infested: *E. alatus* Siebold, *E. japonicus* (L.), and *E. kiautschovicus* Loesener. This adventive ermine moth is now well established in the eastern half of the United States, with records known from Maine, Maryland, Michigan, Pennsylvania, Vermont, and Wisconsin (Johnson and Lyon 1988, Hoover 1993).

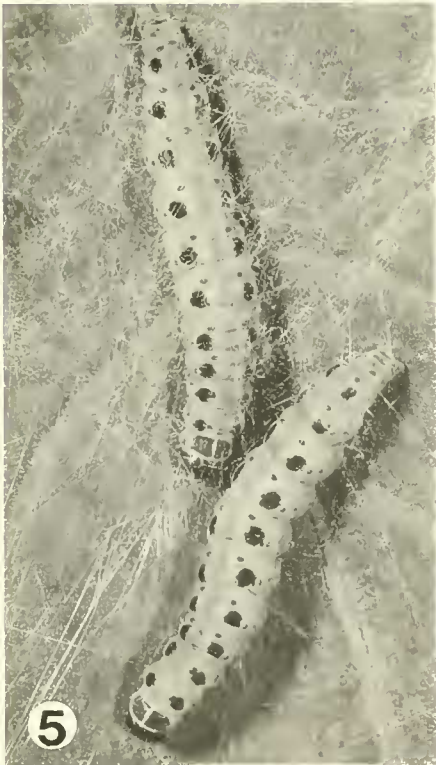
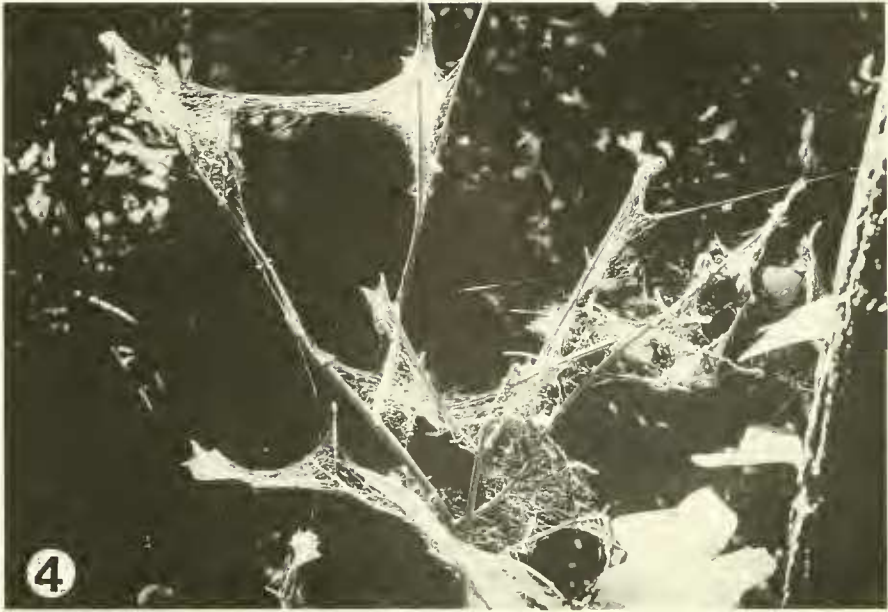
Remarks.—Large larval populations, or colonies, were found in webs on *E. europaeus*, with the characteristic defoliation observed on several spindle trees in Cornwallis Park near Halifax Harbour and in the Public Gardens.

Recognition features.—In an advanced stage of infestation, the presence of extensive webbing on foliage of *Euonymus* (Fig. 4) and masses of gregarious larvae within the webs serve as the best indicators of the presence of this destructive pest. The mature larvae (Fig. 5) are 2–2.25 cm long, green or yellowish green, somewhat darker dorsally, and with a subdorsal row of conspicuous round black spots. The adult moth (Fig. 6) is characterized by having a white forewing with three longitudinal rows of black spots and a gray hindwing (in both sexes); the fringe of the hindwing is pale gray or whitish at the anal angle. Additional larval

Figs. 1–3. Damaged viburnum foliage, and adult stages of *Pyrrhalta viburni* and *P. luteola*. 1, 2, Foliage and inflorescences of *Viburnum opulus* damaged by feeding of larval *P. viburni*, characterized by leaf skeletonizing. 3, Adult *P. viburni* (left), and *P. luteola*, the elm leaf beetle (right).



Maps 1-3. Known geographic distribution in North America of the adventive species *Pyrrhalta viburni* (Map 1); *Yponomeuta cagnagella* (Map 2) (open circles represent state records only, no specific localities given); and *Macrophyta punctumalbum* (Map 3).



Figs. 4-6. Host plant damage, and larval and adult stages of the spindle tree ermine moth, *Yponomeuta cagnagella*. 4, Larval webbing draping defoliated branches of the host plant, *Euonymus europaeus*. 5, Last-instar larvae. 6, Adult female. Figures reproduced with permission from Hoebeke (1987).

and adult characteristics can be obtained from Hoebeke (1987).

References.—Relevant information on this immigrant's seasonal history, habits, host plant preferences, and suspected mode of introduction in North America is provided by Hoebeke (1987). Povel (1984) differentiates the European species of small ermine moths of the *Yponomeuta padella*-complex, including *Y. cagnagella*, comments on the morphology of all life stages of members of this complex, and gives keys to the identification of *Yponomeuta* adults, pupae, and last-instar larvae.

Macrophya punctumalbum (L.)
(Figs. 7–10; Map 3)

Historical background.—The first North American collections of this Palearctic sawfly were made in Ontario (Toronto) in 1932 and British Columbia (Vancouver) in 1934 (Gibson 1980). It is also known in the Nearctic Region from Quebec (Gibson 1980) and New York (Hoebeke and Johnson 1985). This specialist on plants of the Oleaceae feeds primarily on ash (*Fraxinus*) and privet (*Ligustrum*) in Europe and has been collected on these hosts and on lilac (*Syringa*) in Canada (Gibson 1980) and the United States (New York) (E. R. Hoebeke, unpubl. data).

Remarks.—Numerous adults (females) were observed on common privet (*L. vulgare* L.) in Cornwallis Park near Halifax Harbour, and on the campuses of Dalhousie University and the Technical University of Nova Scotia.

Recognition features.—Adult and larval feeding damage alone are characteristic signs of the presence of this sawfly. Adult feeding consists of irregular "rasping" marks on the upper epidermis of privet foliage (Fig. 7), and adults also produce shiny, black fecal material that is deposited as irregular tarlike spots on the upper leaf surfaces. Larval feeding consists chiefly of circular holes in the interior of the leaves (Fig. 8).

The adult female (Fig. 9) is a characteristically large and attractive sawfly that has a predominantly black (with some white) body, with contrasting bright, reddish hind femora. Mature larvae (Fig. 10) are generally lime green with a yellowish head capsule.

References.—The seasonal history, habits, and host plant preferences of *M. punctumalbum* were studied at Ithaca, N.Y., in an ornamental planting of California privet (*L. ovalifolium* Hassk.) (Hoebeke and Johnson 1985). Hoebeke and Johnson (1985) also describe and illustrate the egg and last-instar larva. Pomerantzev (1930) reviewed the biology of this species in Europe.

DISCUSSION

The detection of *Pyrrhalta viburni*, *Yponomeuta cagnagella*, and *Macrophya punctumalbum* in Nova Scotia adds to the considerable number of adventive species previously recorded from the Maritime Provinces. More European insects have been collected in the Maritimes and Newfoundland (Atlantic Provinces) than in any other region of the New World (e.g. Brown 1940, 1950, 1967, Lindroth 1957, Turnbull 1979, Hamilton 1983, Morris 1983, Wheeler and Henry 1992). Ship's ballast was the primary early pathway of introduction for ground-dwelling forms such as certain ground beetles (Carabidae) and otiorhynchine weevils (Curculionidae), but since the late nineteenth century the importation of ornamental nursery stock has been a principal mode of entry for a number of Old World insects (Lindroth 1957, Sailer 1983).

In the absence of comprehensive faunal surveys for North America, comments on pathways of entry and subsequent spread of *P. viburni*, *Y. cagnagella*, and *M. punctumalbum* are admittedly speculative. The available North American records suggest multiple introductions—perhaps along the lower St. Lawrence Valley and adjacent



Figs. 7-10. Damaged privet foliage, and life stages of the European privet sawfly, *Macrophya punctumalbum*. 7, Feeding damage by adult sawflies, characterized by irregular "rasping" marks and rectangular holes, and tarlike spots. 8, Feeding damage by adults and larvae; the small round holes in the leaf interiors and the irregular leaf margins are caused by larvae. 9, Adult female. 10, Mature (feeding) larvae (length of mature larva ranges from 14.4-18 mm). Figures reproduced with permission from Hoebeke and Johnson (1985).

Quebec and at Halifax (or other ports) in Nova Scotia. Multiple introductions of European species have been frequent in Canada, and the port city of Halifax is particularly noted for its adventive insect fauna (Brown 1940, 1950, 1967). Despite the recent detection of these three species in the Maritimes, they could have been introduced directly into Nova Scotia and, once established, shipped with nursery stock to other parts of Canada. The further spread of these potentially serious pests of several commonly used ornamental shrubs and trees should be monitored.

ACKNOWLEDGMENTS

We thank the Entomological Society of America and the Entomological Society of Washington for permission to reproduce Figs. 4–6 and Figs. 7–10, respectively.

LITERATURE CITED

- Balachowsky, A. S. 1963. Entomologie appliquée à l'agriculture. Traité. Tome I, Coléoptères (Second Volume). Masson, Paris. 1391 pp.
- Becker, E. C. 1979. *Pyrrhalta viburni* (Coleoptera: Chrysomelidae), a Eurasian pest of *Viburnum* recently established in Canada. *Canadian Entomologist* 111: 417–419.
- Brown, W. J. 1940. Notes on the American distribution of some species of Coleoptera common to the European and North American continents. *Canadian Entomologist* 72: 65–78.
- . 1950. The extralimital distribution of some species of Coleoptera. *Canadian Entomologist* 82: 197–205.
- . 1967. Notes on the extralimital distribution of some species of Coleoptera. *Canadian Entomologist* 99: 85–93.
- Gibson, G. A. P. 1980. A revision of the genus *Macrophya* Dahlbom (Hymenoptera: Symphyta, Tenthredinidae) of North America. *Memoirs of the Entomological Society of Canada*. No. 114. 116 pp.
- Hamilton, K. G. A. 1983. Introduced and native leafhoppers common to the Old and New Worlds (Rhynchota: Homoptera: Cicadellidae). *Canadian Entomologist* 115: 473–511.
- Hoebeke, E. R. 1987. *Yponomeuta cagnagella* (Lepidoptera: Yponomeutidae): A Palearctic ermine moth in the United States, with notes on its recognition, seasonal history, and habits. *Annals of the Entomological Society of America* 80: 462–467.
- Hoebeke, E. R. and W. T. Johnson. 1985. A European privet sawfly, *Macrophya punctumalbum* (L.): North American distribution, host plants, seasonal history and descriptions of the immature stages (Hymenoptera: Tenthredinidae). *Proceedings of the Entomological Society of Washington* 87: 25–33.
- Hoover, G. A. 1993. Euonymus caterpillar, *Yponomeuta cagnagella* (Hubner) (Lepidoptera: Yponomeutidae). *Regulatory Horticulture* 19(2): 25–27.
- Johnson, W. T. and H. H. Lyon. 1988. *Insects that Feed on Trees and Shrubs*, 2nd ed. Cornell University Press, Ithaca, N. Y. 556 pp.
- Lindroth, C. H. 1957. *The Faunal Connection between Europe and North America*. Wiley, New York. 344 pp.
- Morris, R. F. 1983. Introduced terrestrial insects, pp. 551–591. *In* South, G. R., ed., *Biogeography and ecology of the island of Newfoundland*. W. Junk, The Hague, Netherlands.
- Pomerantzev, D. V. 1930. The biology of sawflies on ash. *Bulletin of the North Caucasian Plant Protection Station, Fostov-na-Donu*, No. 6: 27–32. [In Russian with German summary.]
- Povel, G. D. E. 1984. The identification of the European small ermine moths, with special reference to the *Yponomeuta padellus*-complex (Lepidoptera, Yponomeutidae). pp. 149–180. *In* Povel, G. D. E. [Thesis University of Leiden (December 10th 1987)], *Pattern Detection within the European Forms of Yponomeuta* (Lepidoptera, Yponomeutidae). *Studies in Yponomeuta*, No. 5.
- Sailer, R. I. 1983. History of insect introductions, pp. 15–38. *In* Wilson, C. L. and C. L. Graham, eds., *Exotic Plant Pests and North American Agriculture*. Academic, New York.
- Turnbull, A. L. 1979. Recent changes to the insect fauna of Canada, pp. 180–194. *In* Danks, H. V., ed., *Canada and its Insect Fauna*. *Memoirs of the Entomological Society of Canada*. No. 108.
- Turner, K. B., C. S. Kirby, and B. W. Dance. 1975. *Common pests of ornamental trees and shrubs*. Ontario Ministry of Natural Resources, Publication PC.3. 64 pp.
- Wheeler, A. G., Jr. and T. J. Henry. 1992. A synthesis of the Holarctic Miridae (Heteroptera): Distribution, biology, and origin, with emphasis on North America. *Thomas Say Foundation Monograph* 15. Entomological Society of America, Lanham, Md. 282 pp.